A STUDY OF THE RESIDUAL IONIZATION IN A GAS WITH REFERENCE TO TEMPERATURE EFFECTS.

By C. H. KUNSMAN.

[Abstracted from *Physical Review*, October, 1920 (2), 16: 349-361.]

Special apparatus permitted a quick and accurate test of the insulation properties under the same conditions as those under which the ionization tests were made; and a subjection of the instrument to a wide range of temperature. Results show that the number of ions generated per cubic centimeter within an airtight chamber is 8.22 per second in the basement of the physical laboratory, University of California, and 4.15 over the Pacific Ocean.

This electrical conductivity, or residual ionization, is not due to molecular impact of thermal agitation; the apparent increase in ionization as observed at high altitudes is solely a temperature effect, and is due to an increase in conduction over the insulation; the effect of changes in temperature on the insulation system of an apparatus of this kind is sufficient to account for the daily and seasonal apparent variations of the residual ionization as reported by some observers, and is not due to a variation of the ionization of the gas within the chamber.

It would seem that it is not necessary to assume, as has been done by previous investigators, that there is a highly radioactive cosmic layer in the upper atmosphere; or that the sun is a source of penetrating radiation sufficient to generate 90 ions per cubic centimeter per second.—*E. W. W.*

ON THE VARIATIONS OF THE RADIOACTIVITY OF THE SPRINGS OF BAGNOLES-DE-L'ORNE AND THEIR RELATION TO RAINFALL.

By P. LOISEL.

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The principal portion of the variations in the intensity of the radioactivity of the springs of Bagnoles-de-l'Orne is found to depend upon the time and amount of rainfall. Apparently the waters percolate through the earth, become charged with the radioactive material, and then reappear at the springs; a maximum of intensity occurs several days after the rain. This would appear to be a universal phenomenon, and one worthy of extended study from geologic, mineralogic, and therapeutic standpoints.—*E. W. W.*

CAN WE EXTEND OUR ANNUAL TEMPERATURE RECORD BACK FOR 30,000 YEARS?[1]

Baron Gerard De Geer, of Stockholm, Sweden, has come to the United States with several assistants in order to connect the glacial chronology of Scandinavia with that of America and to count the annual layers of glacial clays back, perhaps 10,000 years farther into the past. Summer after summer the receding continental glaciers left distinct layers of clay on the bottoms of fresh-water lakes. Summers warmer than usual seem to have been responsible for the thicker layers, and summers cooler than the average, for the thinner layers. The zigzag plots of the thicknesses of successive layers of clay remind one strongly of the form of the "curve" of temperatures of successive summers at present—except that the clay "curves" show some great changes due undoubtedly to important changes in glacial drainage.

But perhaps we are jumping at conclusions when we ascribe to temperature departures the thickness of sediment deposited from glacial waters. Perhaps there was a winter of excessive snowfall which, in even a normal summer, would have melted sufficiently to supply an abnormally great volume of water. Before we can convert glacial clay laminæ into records of temperature and precipitation, a study of deposition from existing glaciers under different departures of summer temperature and winter snowfall and rainfall appears to be necessary.

Nevertheless, the situation looks hopeful. We have before us: Accurate instrumental observations for somewhat more than a century, historical records of ice in rivers and of unusual seasons for a dozen or more centuries farther back; tree rings giving approximate annual conditions back a score of centuries farther; then glacial clay laminæ back 100 to 250 centuries more. Beyond this our annual record fails and we measure climatic epochs by units tens of thousands to millions of years in length.

Our passing years sink into insignificance before this array of thousands and thousands of years, and our "stationary" climate becomes but a transitory state when judged by the units of time given by the earth's record of weather.—*Charles F. Brooks.*

[1] Discussion suggested by two notes in *Science*, Sept. 24, and Nov. 26, 1920, N. S. vol. 52: 284; 502-503, and by Baron De Geer's address before the Geological Society of Washington, Dec. 7, 1920.

SEASONAL DEPOSITION IN AQUEO-GLACIAL SEDIMENTS.

By ROBERT W. SAYLES.

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The main factors which can produce differential aqueo-glacial sedimentation are the swinging of a stream across a delta; the difference of day and night melting of glaciers; more or less regular cyclonic and anticyclonic conditions during part of the year, with or without rain or high winds; periodic or seasonal winds capable of transporting sediment; tides; and the alternating conditions of summer and winter.

Evidence of seasons (other than the apparent seasonal banding in glacial deposits) in the Permo-Carboniferous have come from New South Wales, Australia, in the discovery of annual rings of growth in trees of Permian age. From Brazil similar evidence of seasons was obtained in fossil trees of the same age.—*C. F. B.*